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August 16, 1991

Mr. R. Sturgeon
U.S. Environmental Protection Agency
Region III
DELMARVA/DC/WV Remedial
Enforcement Section
841 Chestnut Building
Philadelphia, PA 19107

RE: COMMENTS ON EXPLANATION OF SIGNIFICANT DIFFERENCES FOR DELAWARE CITY PVC SITE, DELAWARE CITY, DE

Dear Mr. Sturgeon:

ICI Americas Inc., on behalf of Stauffer Management Company (Stauffer), is providing these comments on the Explanation of Significant Differences (ESD) from the Record of Decision for the Delaware City PVC Site, Delaware City, Delaware. As explained below, Stauffer considers the installation of an activated carbon adsorption system on the air stripper exhaust at the Delaware City Site to be unnecessary in light of current operating information which may not have been known or fully considered by the EPA. Stauffer is also concerned that EPA would arbitrarily impose this requirement when the Delaware Department of Natural Resources and Environmental Control (DNREC) has already determined that the emissions from the air stripper are not of sufficient magnitude to warrant control.

The ESD states that the air stripper is being used for groundwater treatment prior to discharge instead of reuse/treatment of the water in the Formosa Plastic Plant because of potential reuse problems and discharge limitations in the Formosa NPDES permit. The ESD says air emission controls will be required because the air stripper total VOC emissions are currently about 12 lbs/day and will likely exceed the 15 lbs/day total VOC guidance criteria for an ozone non-attainment area. This last statement appears to be based on confusing information which should be clarified prior to making a final decision regarding the need for additional controls.

Stauffer has installed and is currently operating ten interceptor wells at the site, four to the north and six to the south. In

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addition, Stauffer voluntarily converted two monitoring wells with elevated groundwater VOC to temporary "hot spot" interceptor wells. These "hot spot" wells and the interceptor wells were pumped at maximum capacity upon startup to achieve a quick reduction in local groundwater VOC concentrations. The 12 lbs/day total VOC stripper emission rate referenced in the ESD was for June, 1991, when Stauffer was pumping the "hot spot" wells and pumping the interceptor wells at a high rate.

However, operation of the "hot spot" wells and the heavy pumping of the interceptor wells is not necessary to ensure containment of the plume nor is it expected to significantly reduce the overall groundwater cleanup time. This mode of operation through June has reduced the "hot spot" wells VOC concentration by 85-90% and most interceptor well concentrations by at least 75%. Stauffer believes that this has achieved the voluntary goal of an expedited reduction in local groundwater VOC. Accordingly, in early July, 1991, Stauffer shut down the "hot spot" wells and reduced the heavy pumping of interceptor wells for the purpose of reducing localized groundwater VOC concentrations while continuing to contain the plume.

After these operational changes were made, the total VOC emissions from the stripper were reduced to about 4.1 lbs/day. Stauffer has had a hydrogeology consultant, S. S. Papadopulos and Associates, prepare an estimate of the future VOC concentration in groundwater at Intercept Well B which currently contributes about 95% of the organic load to the air stripper. (See attached Papadopulos report.) Based upon Papadopulos' estimate for Well B, the future total VOC stripper emissions would rise to a probable maximum of about 5.8 to 7.2 lbs/day total VOC for a period of about one year before declining to less than 3 lbs/day for long-term operation of the intercept system.

At the request of EPA, Stauffer is currently updating the Risk Assessment for the air stripper emissoins. Although this work is still in progress, sufficient evaluation has been conducted to demonstrate that the cumulative risk from the projected emissions will be below a $1x10^{-6}$ level.

The cost of installing and operating the adsorption system is another important factor which cannot be ignored. As part of the previous design activities for the site, Stauffer had investigated the use of activated carbon on the air stripper exhaust. The estimated capital cost for installing such a system was about $400,000 to $600,000. With annual operating and maintenance costs of about 10% of capital and a cost recovery factor of 0.14 (based on 10-year equipment life and 8% interest), the annualized costs of the system are about $96,000 to $144,000/yr. At the higher estimated probable maximum emission rate (7.2 lbs/day) and

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the lower annualized cost ($96,000/yr.), the cost for controlling the emissions is about $70,000/ton assuming 100% control. This is in vast excess of the "general" Best Available Control Technology (BACT) cost cutoff range of about $2,000 to $5,000/ton and therefore, is not necessary.

Stauffer has concluded, based on the above information, that there is no need to install any air pollution control system on the air stripper exhaust at the Delaware City PVC site. Therefore, the ESD relating to the installation of the carbon adsorption system on the air stripper exhaust should not be approved.

We would be most willing to discuss any issues related to the emissions from the stripper after your careful review of these comments. Please contact me at (302) 886-4322 if you have any questions or concerns regarding this matter.

Sincerely yours,

ENVIRONMENTAL SERVICES & OPERATIONS

ML Beers
M. L. Beers
Environmental Engineering Associate

MLB/llb
3L081391

cc: S. Johnson - DNREC

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S. S. PAPADOPULOS & ASSOCIATES, INC.
CONSULTING GROUND-WATER HYDROLOGISTS

S. S. PAPADOPULOS
S. P. LARSON
C. B. ANDREWS

THIS IS THE
ORIGINAL OF THE
FAX SENT TO YOU
ON 7-30-91

July 30, 1991

Mr. Mel L. Beers
Environmental Engineering Associates
ICI Americas, Inc.
Environmental Services and Operations
Shipley Building
Wilmington, Delaware 19897

Re: PROJECTED CONCENTRATION OF EDC FROM EXTRACTION WELL B

Dear Mr. Beers:

We have evaluated hydrogeologic and water quality conditions at the Delaware City PVC Site and prepared projections of expected concentrations of EDC from Well B, as you have requested. Our analysis relies on 1990 and recent water quality data to define initial and subsequent water quality conditions in this region of the aquifer. We employ transport modeling techniques with this data to project present and future water quality conditions, given the initial conditions at the onset of pumping. We have used water quality data collected during the course of pumping in the past year as a check on the model's capability to replicate actual conditions. While there are a number of uncertainties involved in a modeling exercise such as this, and we expect variations about the predicted concentrations to occur, we believe that the results can be considered a reasonably good estimate, given the available information. We provide three projections: a high projection, a low projection and a "best estimate". Our "best estimate" projects that the maximum concentration from Well B will be in the range of 7,000 to 10,000 parts per billion. The maximum may not have been observed yet, with the projected maximum occurring following one half to two years of pumping. Concentrations will likely persist at the maximum level for a period of one to two years, as shown on Figure 1. The following sections of this letter contain additional details concerning the procedures and results of this evaluation.

Calculational Procedures

The projected concentrations of EDC were calculated using the finite difference particle-tracking transport model, MT3D (Zheng, C., 1990, A Modular 3-D Transport Model for Simulation of Advection, Dispersion and Chemical Reactions of Contaminants in Ground-Water Systems, to be

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published by U.S. E.P.A.). Hydraulic parameters in the model were selected on the basis of conditions in the vicinity of Well B. A local hydraulic gradient of 0.003 foot/foot to the south and hydraulic conductivity of 90 feet per day have been obtained for this region and were used in the model. The model was run using a pumping rate of 80 gpm for Well B and 23 gpm for Well D.

Maximum concentrations observed in monitor wells during 1990 formed the basis for assumed initial concentrations of EDC at the beginning of the modeled period. These concentrations are shown for individual wells on Figures 2 and 3. Initial concentrations for use in the each node of the model grid were obtained by kriging the measured concentrations. Two cases were initially developed. In Case 1, the concentrations were obtained by logarithmic kriging. Representative concentration contour lines obtained with this procedure are shown on Figure 2. For Case 2, the concentrations were obtained by arithmetic kriging. Representative concentration contour lines obtained with this procedure are shown on Figure 3. The transport model was run for each of Case 1 and Case 2.

In many situations, logarithmic kriging yields the most realistic distribution of concentrations in heterogeneous natural settings. However, in some cases, depending on the location and number of data points, logarithmic kriging will underestimate the size of the actual plume. An examination of the results of Case 1 (Figure 1) suggest that this may be so at this site, as the projected results for the first 200 days of pumping underestimate the observed concentrations at Well B. Alternatively, projections were made in Case 2, using arithmetically kriged concentrations, which reflect a plume of greater extent and greater concentration in the fringe area. However, the projected results of Case 2 (Figure 1) overestimate the observed concentrations and the projected concentrations are considered to be high. The analyses of Case 1 and Case 2 illustrate the sensitivity of the solution to the initial concentrations assumed for the areas where data is unavailable.

An evaluation of the initial concentration distributions used in Case 1 and Case 2, considering flow conditions at the site, and a comparison of the observed concentrations at Well B with the projected conditions, indicate the actual concentrations will most likely fall between those predicted by Case 1 and Case 2. The "best estimate" represents the average of Case 1 and Case 2 and is compared to the observed concentrations on Figure 1. While concentrations are expected to vary within the range bracketed by the low projection of Case 1 and the high concentration of Case 2, a mid-range projection, represented by the "best estimate" projection on Figure 1, is representative of expected future average conditions. However, it should be recognized that if "hot spots" exist in the aquifer which have not been detected, short-term increases beyond projected values may occur.

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EDC Load to Treatment Plant from Well B

Assuming that Well B is pumping at 80 gpm, a concentration of 8,500 ppb will result in a mass loading of about 8.2 pounds per day. If the concentration were to increase to 10,000 ppb, the load would be about 9.6 pounds per day. If pumping occurs at 100 gpm, the load would be proportionately higher, and clean-up will occur at a faster rate than projected. However, capture zone calculations indicate that a pumping rate of 60 gpm would be sufficient to contain the area containing high concentrations in the vicinity of Well B, under the hydrogeologic conditions assumed above. If concentrations increase beyond the expected values such that loads become unacceptable at higher pumping rates, a decrease to 60 gpm may be advisable for an interim period of time.

Please let us know if you have questions on these analyses or if you need additional information.

Sincerely,

S. S. PAPADOPULOS
& ASSOCIATES, INC.

Deborah L. Hathaway

Deborah L. Hathaway
Senior Hydrologist

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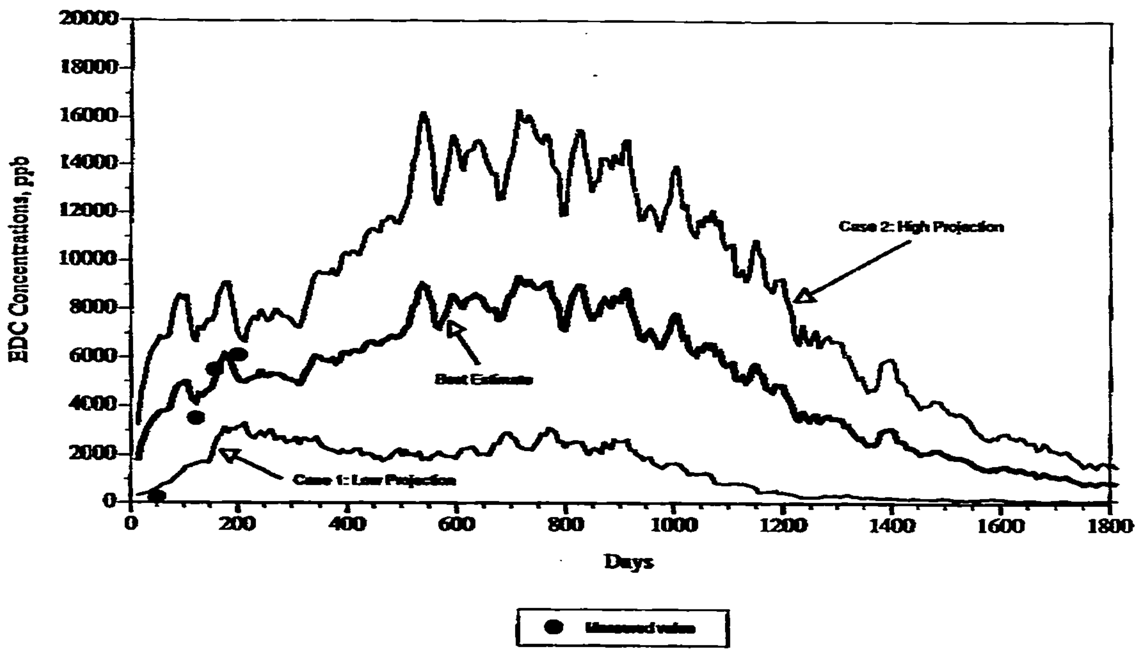

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PROJECTED CONCENTRATION OF EDC IN WELL B

FIGURE 1

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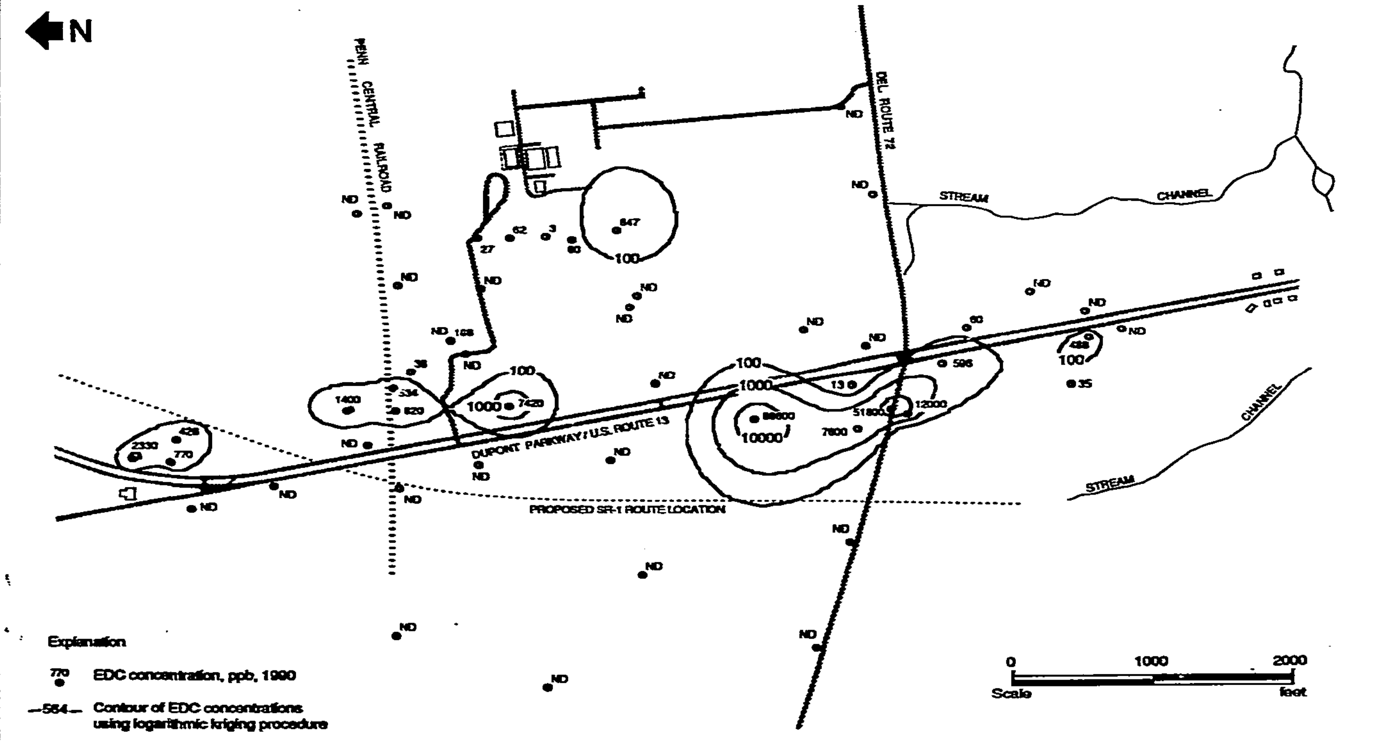

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INITIAL EDC DISTRIBUTION: CASE 1

FIGURE 2

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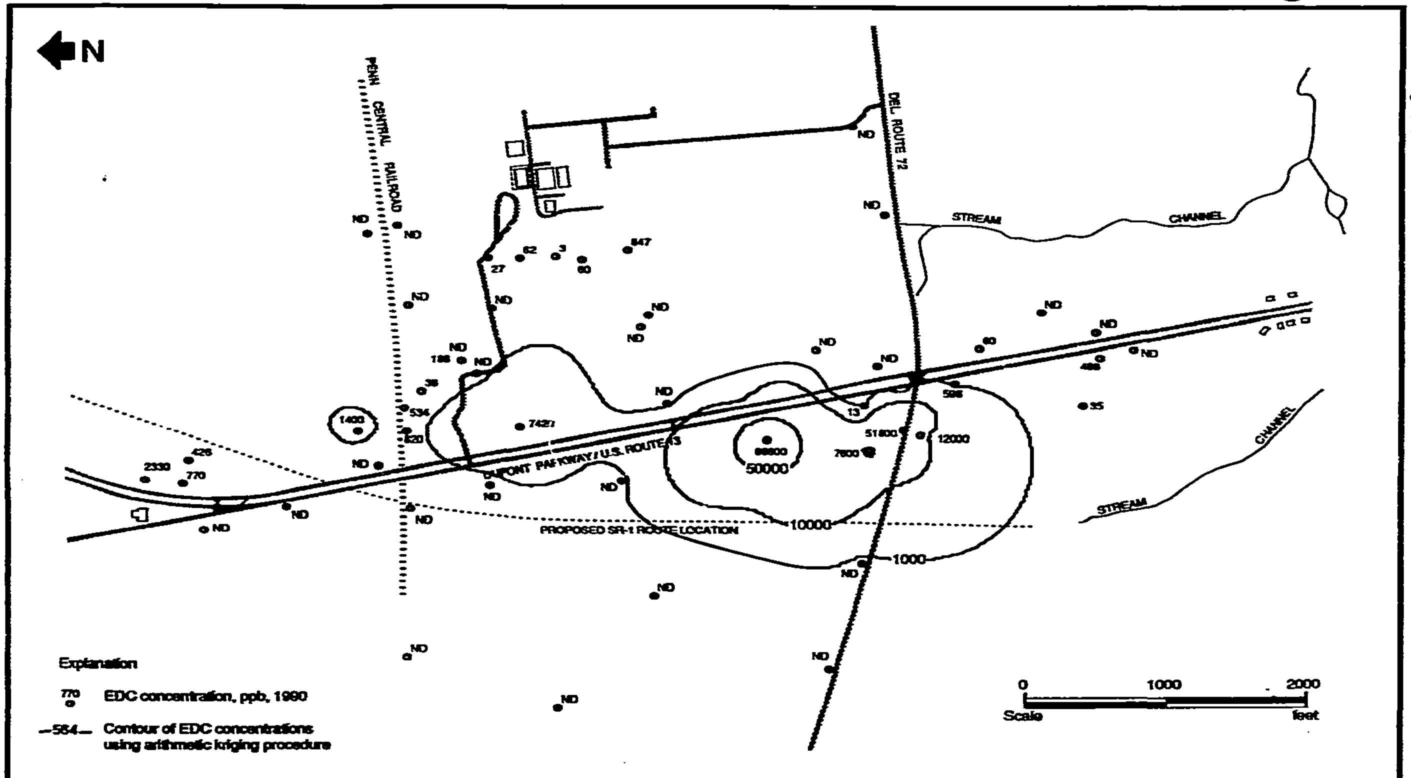

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INITIAL EDC DISTRIBUTION: CASE 2

FIGURE 3

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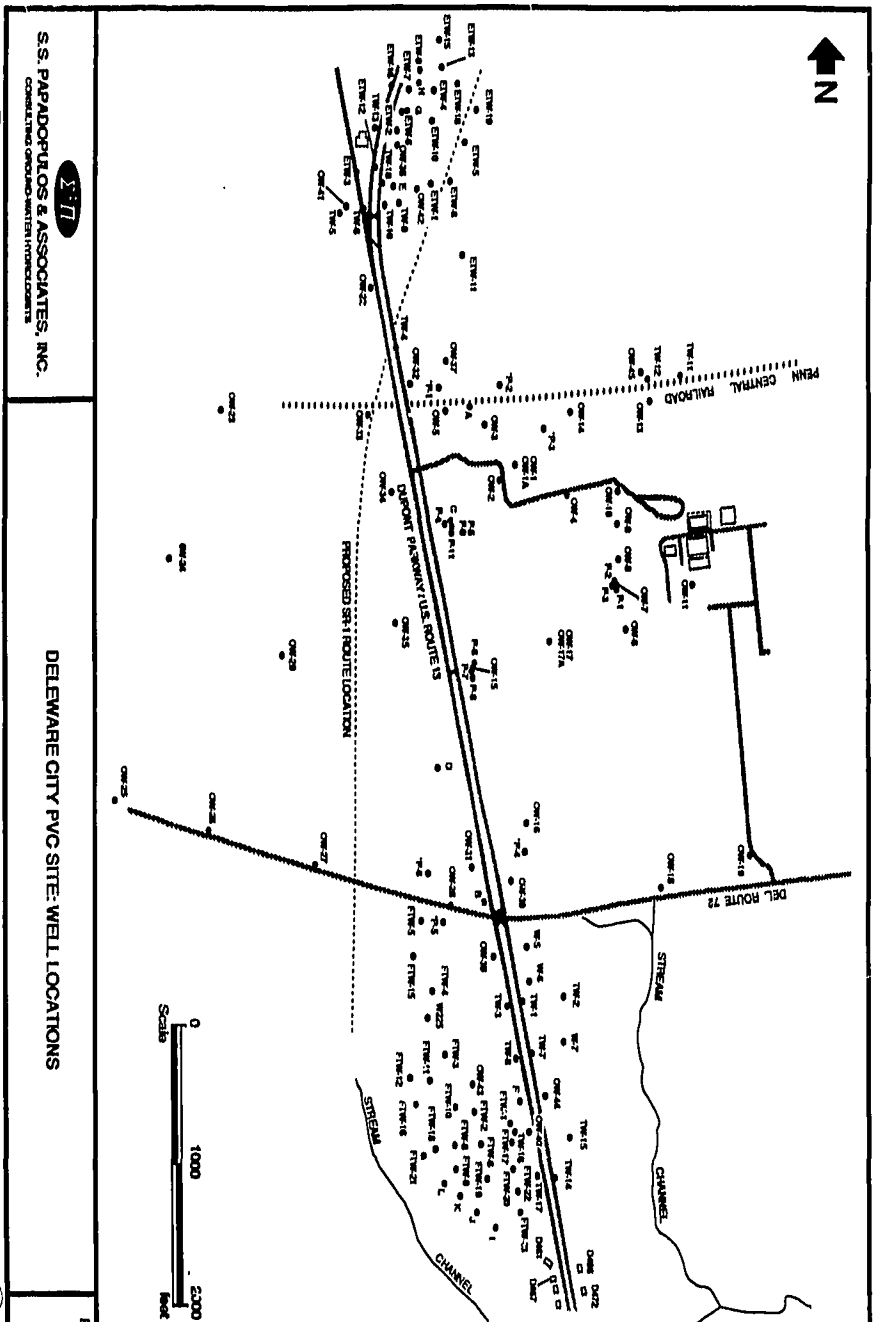

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